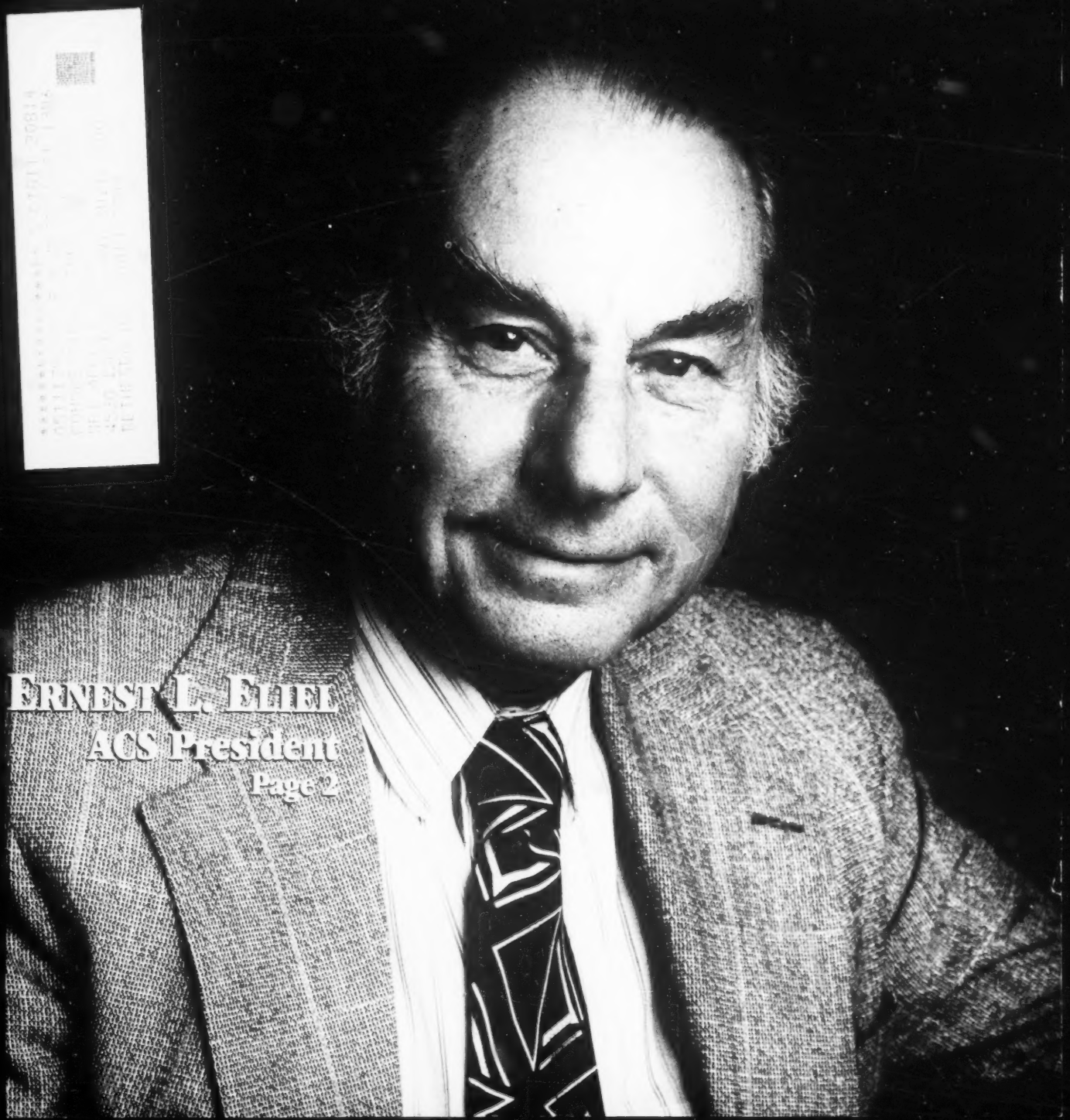
CHEMICAL & ENGINEERING NEWS

C&EN

JANUARY 6, 1992

HOW NSF DIRECTOR MASSEY FARES AFTER NEARLY A YEAR IN OFFICE PAGE 9



ERNEST L. ELIEL
ACS President
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CHEMICAL & ENGINEERING NEWS

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NEWS OF THE WEEK

■ Proposed global trade rules governing patents are criticized by representatives of chemical, pharmaceutical industries. Page 6

■ Caltech researchers report first use of timed sequence of laser pulses to control a chemical reaction. Page 7

■ Federal Bureau of Investigation defends its use of DNA "fingerprinting" in criminal cases against charges of misuse raised by two scientists. Page 7

■ The roles of two-year colleges in science, engineering, and math education should be given increased attention, a recent NSF report urges. Page 8

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COVER: Photo by Jane Hamborsky

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Business

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Meetings

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NEWS FOCUS

With nearly a year of tenure behind him, NSF director Walter Massey is ushering in changes calculated to provide greater accountability, efficiency, and effectiveness to academic research oversight. Page 9

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LETTERS

Graphitic tubules

The graphitic tubules described in the Science/Technology Concentrates column (C&EN, Nov. 11, 1991, page 25) may not be a new carbon form. Hyperion Catalysis International Inc. of Lexington, Mass., makes and sells carbon of apparently similar structure.

What may be of interest to C&EN readers is that the Hyperion material is made catalytically from gaseous precursors at far less drastic conditions than used by the NEC researchers. (See, for instance, U.S. Patent 4,663,230.) The literature on such catalytically grown carbons clearly shows a family of tubular carbon forms with varying carbon orientations and properties.

The Hyperion patent cited above covers as a composition of matter the morphology described as "gift wrapping" in your article.

Robert Hoch
Hensonville, N.Y.

Education in Japan

As a transcultural student myself, I relate gratefully to the keen observations and opinions expressed in the special report, "Scientific Research & Education in Japan," by Koji Nakanishi (C&EN, Dec. 2, 1991, page 30).

Aside from various informative statistics that Nakanishi compiled throughout the report, his insight and in-depth comparison of the academic, and, to a lesser extent, industrial research in chemistry in the U.S. and Japan was invaluable not only to all fellow scientists and educators in the field but also to policymakers on both sides of the Pacific.

Having experienced three different education systems from Taiwan to Singapore to the U.S. during my high school and college period, I share Nakanishi's observation that the Japanese education system—the same is also currently practiced in Taiwan and Singapore—has traditionally been more stringent at the precollegiate level than in the West (that is, from kindergarten to high school). And its mission has been primarily geared toward the preparation of taking the annual university entrance exams. Such a system does foster youngsters with great discipline and solid foundation for advanced study. However, it falls short on encouraging advanced research at the university and graduate school level due to exhaustion from passing the entrance exams and rigidly controlled proposal evaluation procedures.

On the contrary, the elementary and high school education system in the U.S. has been regarded recently as a failure in the public's eyes. Nevertheless, the social attitude toward freedom and choice here in the U.S. dominates the fundamental philosophy of its higher education system, which effectively emphasizes individuality and creativity, and promotes new visions and ideas in all areas of scientific research.

By comparing and understanding the differences and similarities of various education systems in other countries, perhaps a better framework of precollegiate education and advanced research policies here in the U.S. may be formulated in years to come.

Wilhelm W. Wang
Princeton, N.J.

Abuse from interviewers

Many of us, men and women alike, face a kind of abuse when we start seeking employment. Molly Gleiser's letter (C&EN, Nov. 4, page 4) about her noninterview represents an extreme case of such abuse from a person who is placed in an advantageous position. My personal experience of having an interview after the position was filled in order to let some company managers dine with me for two days in a number of expensive restaurants, and of having a "lady" interviewer intimidate me, falls beyond the norm. Perhaps for elimination purposes, a "gentleman" interviewer from another chemical company opted to talk about areas where I lacked experience, pounded me with questions, and enjoyed my helplessness.

Probably nothing can be done against the persons who enjoy intimidating and harassing a starter. These abuses are often carried out without any corroboration. These are traumatic and cannot be forgotten. It is unknown to us if there are mechanisms (from the employers' side) to track the abusive behavior of the interviewers. At this point, like Gleiser, we are left with only the option to wish that the abuser will "take a bow" in the future. This never happens! However, the bright side is that the abusers are outnumbered by nice and kind people in every institution or company.

Bhajendra N. Barman
Beaumont, Tex.

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Pollution Prevention Becoming Watchword for Government, Industry

■ ***EPA study of progress on reducing pollutants cites growing role of legislation, proliferation of industry programs***

David J. Hanson, C&EN Washington

Just as the decade of the 1980s will be remembered for efforts to clean up hazardous waste, the 1990s may be the decade of pollution prevention. Although the public has caught onto this only recently, industry has been working on it for some time. A new report from the Environmental Protection Agency demonstrates how much this concept is taking hold on all aspects of government and industry.

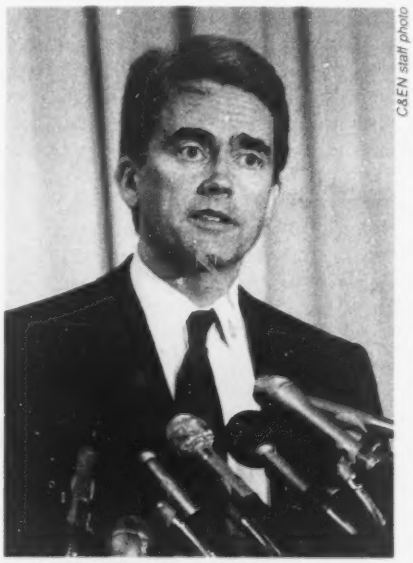
EPA Administrator William K. Reilly sees the change as falling back on common sense, a part of the evolution of environmental protection. "Incorporating pollution prevention into everyday decisions is a major undertaking," he says. "To succeed it will require a better and more sophisticated understanding of the environment."

Much pollution prevention is aimed at manufacturing. Although 32% of carbon monoxide emissions and 31% of volatile organic chemicals emissions to the atmosphere derive from transportation, the biggest play is given to industrial emissions. This is partly because they can be more easily measured and regulated.

In fact, it is such programs as the Toxic Release Inventory of the 1986 Superfund Amendments & Reauthorization Act and the reporting requirements of the Resource Conservation & Recovery Act that tell the public and government what manufacturers are releasing into the environment. The toxics inventory is also one of the few sources of data on what companies are doing to reduce the generation of pollution. More information will become available over the next few years as the 1990 Pollution Prevention Act comes into play.

Because the source reduction reporting on the inventory is voluntary, however, comparatively few facilities have provided the information. EPA says just 11% have indicated pollution prevention activities and that the combination of adjusted numbers and actual reductions makes any trends in pollution prevention unclear. Each year of the inventory, which began in 1987, has generated more prevention data, but new regulations for this year will make such reporting mandatory.

Manufacturers are already moving to make pollution prevention a priority of their own. The EPA report looks at several major industrial associations and the impact they are having on emissions from their members. The Chemical Manufacturers Association, for instance, launched its Responsible Care program in 1988 to improve the industry's management of chemicals. Although Responsible Care does not address pollution prevention directly, one of the program's codes of management practices is on waste and release reduction.



C&EN staff photo

Reilly: falling back on common sense

Other industry associations with environmental principles mentioned in EPA's report include the American Petroleum Institute (API), which has a set of principles its member companies are expected to follow. One of these directly addresses pollution prevention by requiring members to commit to reducing overall emissions and waste generation. API has published some reports containing pollution reduction information. Both the National Paint & Coatings Association and the National Electrical Manufacturers Association provide information to their members on chemical release reduction.

To highlight some individual efforts in pollution prevention, the EPA study looks at what two chemical companies have accomplished. Dow Chemical's Waste Reduction Always Pays program, started in 1986, is credited with cutting its emissions of Toxic Release Inventory chemicals 21% from 1987 to 1989. Dow reports that more than $3 million of special capital funds have been spent on pollution prevention projects over the past three years. EPA also cites Dow's Chem Aware program, which is designed to inform Dow employees and customers on how best to purchase, process, handle, and dispose of Dow products.

EPA mentions Whyco Chromium of Waterbury, Conn., a small company that has been innovative in reducing chemical pollution. EPA points out that the company spent more than $2 million on pollution control in 1990, and spent an increased amount on research programs. The company developed a new method to make its metal-coated products that greatly reduces the amount of cyanide bath solution used.

Although companies can do a lot on their own to reduce pollution, the force that is really moving pollution preven-

tion forward is the federal government. Because of increased pressure on Congress to reduce pollution, several recent laws have pushed pollution prevention to the fore. And federal agencies other than EPA have started to mandate pollution reduction programs.

First among pollution reducing laws is the 1990 Pollution Prevention Act, which goes into effect later this year. The law will force companies to focus on ways to reduce emissions rather than treat wastes. Among other things, the law establishes a source reduction clearinghouse on pollution prevention information; provides for the developing, testing, and disseminating of auditing procedures designed to identify source reduction opportunities; sets up standard methods to measure pollution reduction; expands the toxic release inventory reporting requirements to include questions about source reduction and recycling; and requires EPA to report to Congress on the progress of the reduction programs. Overall, the Pollution Prevention Act has the potential for creating many changes in the chemical industry.

Other laws affecting source reduction are the 1990 amendments to the Clean Air Act; Federal Insecticide, Fungicide & Rodenticide Act; and the Toxic Substances Control Act. The recently passed air pollution law, for example, requires EPA to conduct an engineering research program to develop new technologies for air pollution prevention. And it requires that EPA take into consideration process changes or material substitutions when setting emissions standards for hazardous chemicals. The idea that EPA could force a facility to change its process or materials to reduce emissions worries some chemical industry officials.

In addition to EPA, other federal entities are moving into pollution prevention. The Department of Defense is the largest of these, with more than 1000 major installations worldwide. DOD's major pollution project is the 1989 Directive on Hazardous Material Pollution Prevention. It puts a priority on not using hazardous materials to begin with, and if they are used, it recommends recycling or reusing as much as possible. DOD has also developed its own pollution prevention programs, as industrial companies have, as well as its own R&D program for reducing generation of hazardous waste. Another federal department with a major pollution prevention program mentioned in the report is the Department of Energy.

Other major players in the pollution prevention arena are the states. They have been in the lead on emissions reporting and continue to maintain this lead. The EPA report says there are presently more than 50 state laws that contain some aspect of pollution prevention, more than half of which were enacted in 1990. Most require some sort of facility planning requirement, by which a company must file a written pollution prevention plan. Requirements for these plans vary from state to state, but most include items such as a description of current practices to eliminate or reduce generation of hazardous pollutants, information on the amount of waste generated per unit of production, a list of pollution prevention options considered economical or technically feasible, and specific pollution prevention goals. Other pollution prevention measures adopted by states mentioned in the report include imposition of taxes and fees on hazardous-waste generation, prohibition of the use of certain chemicals such as heavy metals or chlorofluorocarbons, requirement of emissions reporting, and establishment of awards for successful industrial pollution prevention programs.

Even universities are becoming more involved in the pollution movement. Many are providing technical assistance to local businesses in the form of on-site pollution assessments and workshops, the EPA study says. As faculty gain more experience, curriculum changes and research topics in pollution prevention also are increasing. Finally, with some encouragement from expanded environmental regulations, universities are working on reducing the volume of their own hazardous waste by using more microscale methods in labs.

To make the issue of pollution prevention even more complicated, local governments are also getting involved. The EPA study says that city and county governments in California, particularly, have played a major role in industrial pollution prevention. Local governments can offer more flexibility to deal with specific problems than can federal regulations, it says, and they are often in a better position to identify the needs and limitations of local facilities. Common elements in local programs are educational information to local companies, technical and financial assistance, and permits and licenses to force local companies into waste minimization.

The last section of the report looks at sources of pollution other than manufacturing. EPA has not developed any specific pollution prevention strategies for nonindustrial pollution, although the agency is working with other federal departments to do so. These areas include agriculture, where the greatest concerns are runoff of agricultural chemicals and contamination of groundwater; the whole area of energy production and use (although some of this is covered under the Clean Air Act amendments); transportation; consumer awareness of pollution prevention; and pollution by municipalities.

EPA's report, titled "Pollution Prevention 1991: Progress on Reducing Industrial Pollutants," is long on simplistic descriptions of this complicated field and short on specific, detailed examples or data. Admittedly, specifics on source reduction have only begun to be collected by many companies, but chemical companies in particular are anxious to talk about their successes in pollution prevention. The fact that it takes a 200-page report to give a brief overview of pollution prevention activities to date only serves to strengthen the conviction of how important this strategy will be over the next decade. □

CMA survey shows chemical facilities are polluting less

Millions of tons	Number of facilities	Liquid waste	Solid waste	Total
1981	536	304.4	4.9	309.3
1982	528	289.5	3.0	292.5
1983	722	311.3	3.1	314.4
1984	725	272.2	1.8	274.0
1985	681	210.2	2.2	212.4
1986	529	216.2	1.3	217.5
1987	552	211.6	1.6	213.2
1988	582	213.2	1.6	214.8

Source: Chemical Manufacturers Association